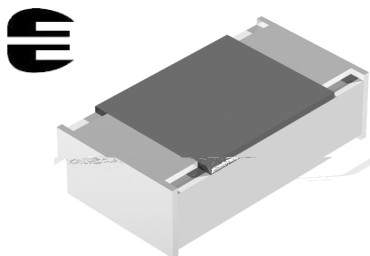


Precision Flat Chip Resistors



Thin Film Flat Chip Resistors combine the proven reliability of the professional products with an advanced level of precision and stability. Therefore they are perfectly suited for applications in the fields of test and measuring equipment together with industrial and medical electronics. The latest member of this product family size 0402 follows the ongoing trend of miniaturisation and enables precision applications in micro circuit designs.

FEATURES

- Approved according to EN 140401-801
- Thin-film technology
- Low TC: ± 10 to ± 25 ppm/K
- Precision tolerance of value: ± 0.1 and ± 0.25 %
- Superior overall stability: class 0.1 and 0.25
- Pure Sn termination on Ni barrier layer
- Compatible with lead (Pb)-free and lead containing soldering processes
- Lead (Pb)-free and RoHS compliant



APPLICATIONS

- Automotive
- Test and measuring equipment
- Medical equipment
- Industrial equipment

METRIC SIZE

| INCH: | 0402 | 0603 | 0805 | 1206 |
|---------|----------|----------|----------|----------|
| METRIC: | RR 1005M | RR 1608M | RR 2012M | RR 3216M |

TECHNICAL SPECIFICATIONS

| DESCRIPTION | MCS 0402 | | MCT 0603 | | MCU 0805 | | MCA 1206 | |
|--|------------------------------------|-----------|---------------------------|-----------|---------------------------|-----------|---------------------------|-----------|
| Metric size | RR 1005M | | RR 1608M | | RR 2012M | | RR 3216M | |
| Resistance range | 100 Ω to 221 kΩ | | 39 Ω to 511 kΩ | | 39 Ω to 1.5 MΩ | | 39 Ω to 2 MΩ | |
| Resistance tolerance | ± 0.25 %; ± 0.1 % | | | | | | | |
| Temperature coefficient | ± 25 ppm/K; ± 15 ppm/K; ± 10 ppm/K | | | | | | | |
| Operation mode | precision | standard | precision | standard | precision | standard | precision | standard |
| Climatic category (LCT/UCT/days) | 10/85/56 | 55/125/56 | 10/85/56 | 55/125/56 | 10/85/56 | 55/125/56 | 10/85/56 | 55/125/56 |
| Rated dissipation, P ₇₀ ¹⁾ | 0.016 W | 0.063 W | 0.032 W | 0.1 W | 0.050 W | 0.125 W | 0.1 W | 0.25 W |
| Operating voltage, U _{max} AC/DC | 12.5 V | 50 V | 25 V | 75 V | 35 V | 150 V | 50 V | 200 V |
| Film temperature | 85 °C | 125 °C | 85 °C | 125 °C | 85 °C | 125 °C | 85 °C | 125 °C |
| Max. resistance change at P ₇₀ | 100 Ω to 221 kΩ | | 39 Ω to 511 kΩ | | 39 Ω to 1.5 MΩ | | 39 Ω to 2 MΩ | |
| 1000 h | ≤ 0.1 % | ≤ 0.2 % | ≤ 0.1 % | ≤ 0.2 % | ≤ 0.1 % | ≤ 0.2 % | ≤ 0.05 % | ≤ 0.1 % |
| 8000 h | ≤ 0.2 % | ≤ 0.4 % | ≤ 0.2 % | ≤ 0.4 % | ≤ 0.2 % | ≤ 0.4 % | ≤ 0.1 % | ≤ 0.25 % |
| 225000 h | ≤ 0.5 % | ≤ 1.0 % | ≤ 0.5 % | ≤ 1.0 % | ≤ 0.5 % | ≤ 1.0 % | ≤ 0.25 % | ≤ 0.5 % |
| Specified lifetime | 225000 h | | 225000 h | | 225000 h | | 225000 h | |
| Insulation voltage : | | | | | | | | |
| 1 minute; U _{ins} | 75 V | | 100 V | | 200 V | | 300 V | |
| continuous | 75 V | | 75 V | | 75 V | | 75 V | |
| Failure rate | ≤ 2 x 10 ⁻⁹ /h | | ≤ 2 x 10 ⁻⁹ /h | | ≤ 2 x 10 ⁻⁹ /h | | ≤ 2 x 10 ⁻⁹ /h | |

Note

1. The power dissipation on the resistor generates a temperature rise against the local ambient, depending on the heat flow support of the printed-circuit board (thermal resistance). The rated dissipation applies only if the permitted film temperature is not exceeded.



MCS 0402, MCT 0603, MCU 0805, MCA 1206 - Precision

Precision Flat Chip Resistors

Vishay Beyschlag

12NC INFORMATION

- The resistors have a 12-digit numeric code starting with 2312.
- The subsequent 4 digits indicate the resistor type, specification and packing; see the 12NC table.
- The remaining 4 digits indicate the resistance value:
 - The first 3 digits indicate the resistance value.
 - The last digit indicates the resistance decade in accordance with the 12NC Indicating Resistance Decade table.

Last Digit of 12NC Indicating Resistance Decade

| RESISTANCE DECADE | LAST DIGIT |
|----------------------------------|------------|
| 10 Ω to 99.9 Ω | 9 |
| 100 Ω to 999 Ω | 1 |
| 1 k Ω to 9.99 k Ω | 2 |
| 10 k Ω to 99.9 k Ω | 3 |
| 100 k Ω to 999 k Ω | 4 |
| 1 M Ω to 9.99 M Ω | 5 |

12NC Example

The 12 NC of a MCT 0603 resistor, value 47 k Ω and TC 25 with ± 0.1 % tolerance, supplied in cardboard tape of 5000 units per reel is: 2312 216 74703.

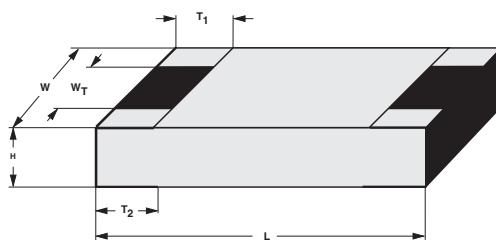
| 12NC - resistors type and packing | | | | | | | |
|-----------------------------------|----------------|--------------|--------------------------|-------------------|--------------------|-------------------|--------------------|
| DESCRIPTION | | | ORDERING CODE 2312... .. | | | | |
| | | | CARDBOARD TAPE ON REEL | | | | |
| TYPE | T.C. | TOL. | P1 1 000 UNITS | P5 5 000 UNITS | PW 20 000 UNITS | E1 1 000 UNITS | E0 10 000 UNITS |
| MCS 0402 | ± 25 ppm/K | ± 0.25 % | - | - | - | 261 6.... | 276 6.... |
| | | ± 0.1 % | - | - | - | 261 7.... | 276 7.... |
| | ± 15 ppm/K | ± 0.25 % | - | - | - | 262 6.... | 277 6.... |
| | | ± 0.1 % | - | - | - | 262 7.... | 277 7.... |
| | ± 10 ppm/K | ± 0.25 % | - | - | - | 263 6.... | 278 6.... |
| | | ± 0.1 % | - | - | - | 263 7.... | 278 7.... |
| MCT 0603 | ± 25 ppm/K | ± 0.25 % | 201 6.... | 216 6.... | 206 6.... | - | - |
| | | ± 0.1 % | 201 7.... | 216 7.... | 206 7.... | - | - |
| | ± 15 ppm/K | ± 0.25 % | 202 6.... | 217 6.... | 207 6.... | - | - |
| | | ± 0.1 % | 202 7.... | 217 7.... | 207 7.... | - | - |
| | ± 10 ppm/K | ± 0.25 % | 203 6.... | 218 6.... | 208 6.... | - | - |
| | | ± 0.1 % | 203 7.... | 218 7.... | 208 7.... | - | - |
| MCU 0805 | ± 25 ppm/K | ± 0.25 % | 241 6.... | 256 6.... | 246 6.... | - | - |
| | | ± 0.1 % | 241 7.... | 256 7.... | 246 7.... | - | - |
| | ± 15 ppm/K | ± 0.25 % | 242 6.... | 257 6.... | 247 6.... | - | - |
| | | ± 0.1 % | 242 7.... | 257 7.... | 247 7.... | - | - |
| | ± 10 ppm/K | ± 0.25 % | 243 6.... | 258 6.... | 248 6.... | - | - |
| | | ± 0.1 % | 243 7.... | 258 7.... | 248 7.... | - | - |
| MCA 1206 | ± 25 ppm/K | ± 0.25 % | 381 6.... | 396 6.... | 386 6.... | - | - |
| | | ± 0.1 % | 381 7.... | 396 7.... | 386 7.... | - | - |
| | ± 15 ppm/K | ± 0.25 % | 382 6.... | 397 6.... | 387 6.... | - | - |
| | | ± 0.1 % | 382 7.... | 397 7.... | 387 7.... | - | - |
| | ± 10 ppm/K | ± 0.25 % | 383 6.... | 398 6.... | 388 6.... | - | - |
| | | ± 0.1 % | 383 7.... | 398 7.... | 388 7.... | - | - |

Resistance ranges printed in bold are preferred T.C./tolerance combinations with optimized availability.

| PART NUMBER AND PRODUCT DESCRIPTION ¹⁾ | | | | | | | | | | | | | | | | | |
|---|---|------------------------------|---|---|--|---|---|---|---|---|-----------------------------|---|-----------------------------|---|---------------------------------|---|---|
| PART NUMBER ²⁾ : MCT06030D4641BPW00 | | | | | | | | | | | | | | | | | |
| M | C | T | 0 | 6 | 0 | 3 | 0 | D | 4 | 6 | 4 | 1 | B | P | W | 0 | 0 |
| MODEL/SIZE | | SPECIAL CHARACTER | | | TC | | | VALUE | | | TOLERANCE | | PACKING ³⁾ | | SPECIAL | | |
| MCS0402 MCT0603 MCU0805 MCA1206 | | 0 = neutral | | | F = ± 10 ppm/K E = ± 15 ppm/K D = ± 25 ppm/K | | | 3 digit value 1 digit multiplier MULTIPLIER 7 = *10 ⁻³ 2 = *10 ² 8 = *10 ⁻² 3 = *10 ³ 9 = *10 ⁻¹ 4 = *10 ⁴ 0 = *10 ⁰ 5 = *10 ⁵ 1 = *10 ¹ 6 = *10 ⁶ | | | B = ± 0.1 % C = ± 0.25 % | | P1 P5 PW E1 E0 | | up to 2 digits 00 = standard | | |
| PRODUCT DESCRIPTION: MCT 0603 -25 0.1% PW 4K64 | | | | | | | | | | | | | | | | | |
| MCT | | 0603 | | | -25 | | | 0.1 % | | | PW | | 4K64 | | | | |
| MODEL | | SIZE | | | TC | | | TOLERANCE | | | PACKING ³⁾ | | RESISTANCE VALUE | | | | |
| MCS MCT MCU MCA | | 0402 0603 0805 1206 | | | ± 10 ppm/K ± 15 ppm/K ± 25 ppm/K | | | ± 0.1 % ± 0.25 % | | | P1 P5 PW E1 E0 | | 47K = 47 KΩ 50R1 = 50.1Ω | | | | |

Note

- Products can be ordered using either the PRODUCT DESCRIPTION or the 12 NC.
- The PART NUMBER is shown to facilitate the introduction of a unified part numbering system. Currently, this PART NUMBER is applicable in the Americas only.
- Please refer to table PACKING, page 151.

DIMENSIONS

| DIMENSIONS - CHIP resistor types, mass and relevant physical dimensions | | | | | | | |
|---|-------------------|-----------------|-----------------|-------------|---------------------|---------------------|-----------|
| TYPE | H (mm) | L (mm) | W (mm) | WT (mm) | T ₁ (mm) | T ₂ (mm) | MASS (mg) |
| MCS 0402 | 0.32 \pm 0.05 | 1.0 \pm 0.05 | 0.5 \pm 0.05 | > 75 % of W | 0.2 + 0.1/- 0.15 | 0.2 \pm 0.1 | 0.6 |
| MCT 0603 | 0.45 + 0.1/- 0.05 | 1.55 \pm 0.05 | 0.85 \pm 0.1 | > 75 % of W | 0.3 + 0.15/- 0.2 | 0.3 + 0.15/- 0.2 | 1.9 |
| MCU 0805 | 0.45 + 0.1/- 0.05 | 2.0 \pm 0.1 | 1.25 \pm 0.15 | > 75 % of W | 0.4 + 0.1/- 0.2 | 0.4 + 0.1/- 0.2 | 4.6 |
| MCA 1206 | 0.55 \pm 0.1 | 3.2 + 0.1/- 0.2 | 1.6 \pm 0.15 | > 75 % of W | 0.5 \pm 0.25 | 0.5 \pm 0.25 | 9.2 |



MCS 0402, MCT 0603, MCU 0805, MCA 1206 - Precision

Precision Flat Chip Resistors

Vishay Beyschlag

| TEMPERATURE COEFFICIENT AND RESISTANCE RANGE | | | | | |
|--|-----------|---------------------------------|-----------------------|-----------------------|-----------------------|
| DESCRIPTION | | RESISTANCE VALUE ⁽¹⁾ | | | |
| T.C. | TOLERANCE | MCS 0402 | MCT 0603 | MCU 0805 | MCA 1206 |
| ± 25 ppm/K | ± 0.25 % | 100 Ω to 221 kΩ | 39 Ω to 511 kΩ | 39 Ω to 1.5 MΩ | 39 Ω to 2 MΩ |
| | ± 0.1 % | 150 Ω to 221 kΩ | 47 Ω to 511 kΩ | 47 Ω to 1.5 MΩ | 47 Ω to 2 MΩ |
| ± 15 ppm/K | ± 0.25 % | 100 Ω to 150 kΩ | 39 Ω to 332 kΩ | 39 Ω to 1 MΩ | 39 Ω to 1.5 MΩ |
| | ± 0.1 % | 150 Ω to 150 kΩ | 47 Ω to 332 kΩ | 47 Ω to 1 MΩ | 47 Ω to 1.5 MΩ |
| ± 10 ppm/K ⁽²⁾ | ± 0.25 % | 100 Ω to 130 kΩ | 39 Ω to 221 kΩ | 39 Ω to 511 kΩ | 39 Ω to 1 MΩ |
| | ± 0.1 % | 150 Ω to 130 kΩ | 47 Ω to 221 kΩ | 47 Ω to 511 kΩ | 47 Ω to 1 MΩ |

Note

- Resistance values to be selected from E96 and E192 series, other values are available on request.
- TC 10 is specified over the temperature range from - 10 °C to 85 °C.

Resistance ranges printed in bold are preferred T.C./tolerance combinations with optimized availability.

| PACKING | | |
|---------|-------------------------------|------|
| MODEL | REEL | |
| | PIECES/ PAPER TAPE ON REEL | CODE |
| MCS0402 | 1000 | E1 |
| | 10000 | E0 |
| MCT0603 | 1000 | P1 |
| | 5000 | P5 |
| | 20000 | PW |
| MCU0805 | 1000 | P1 |
| | 5000 | P5 |
| | 20000 | PW |
| MCA1206 | 1000 | P1 |
| | 5000 | P5 |
| | 20000 | PW |

**DESCRIPTION**

Production is strictly controlled and follows an extensive set of instructions established for reproducibility. A homogeneous film of metal alloy is deposited on a super high grade (96 % Al_2O_3) ceramic substrate and conditioned to achieve the desired temperature coefficient. Specially designed inner contacts are deposited on both sides. A special laser is used to achieve the target value by smoothly fine trimming the resistive layer without damaging the ceramics. A further conditioning is applied in order to stabilize the trimming result. The resistor elements are covered by a blue protective coating designed for electrical, mechanical and climatic protection. The terminations receive a final pure tin on nickel plating.

The result of the determined production is verified by an extensive testing procedure and optical inspection performed on 100 % of the individual chip resistors. Only accepted products are laid directly into the paper tape in accordance with **EN 60286-3**.

ASSEMBLY

The resistors are suitable for processing on automatic SMD assembly systems and for automatic soldering using wave, reflow or vapour phase. The encapsulation is resistant to all cleaning solvents commonly used in the electronics industry, including alcohols, esters and aqueous solutions. The resistors are lead (Pb)-free, the pure tin plating provides compatibility with lead (Pb)-free and lead-containing soldering processes. The immunity of the plating against tin whisker growth has been proven under extensive testing. All products comply with the CEFIC-EECA-EICTA list of legal restrictions on hazardous substances.

This includes full compatibility with the following directives:

- 2000/53/EC End of Vehicle life Directive (ELV)
- 2000/53/EC Annex II to End of Vehicle Life Directive (ELV II)
- 2002/95/EC Restriction of the use of Hazardous Substances Directive (RoHS)
- 2002/96/EC Waste Electrical and Electronic Equipment Directive (WEEE)

Solderability is specified for 2 years after production or re-qualification. The permitted storage time is 20 years.

APPROVALS

The resistors are tested in accordance with **EN 140401-801** (superseding **CECC 40401-801**) which refers to **EN 60115-1** and **EN 140400**. Approval of conformity is indicated by the CECC logo on the package label.

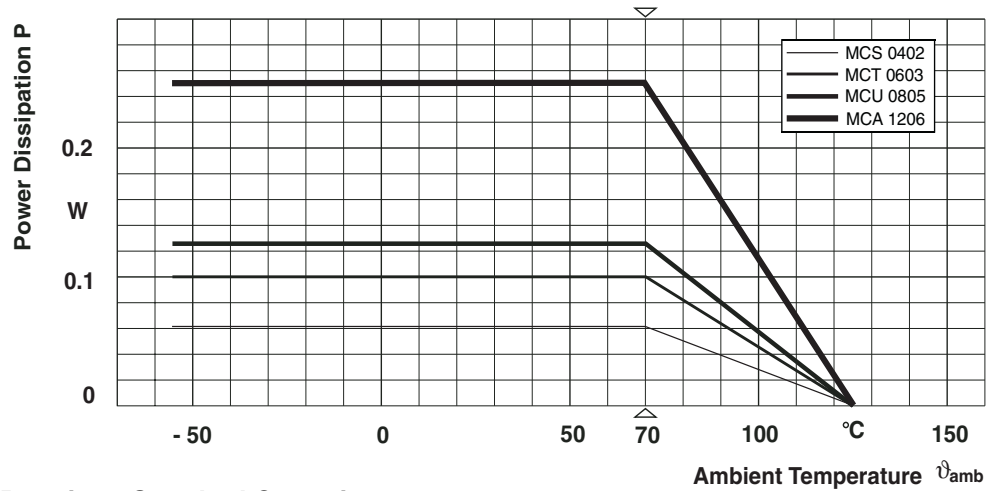
Vishay BEYSCHLAG has achieved "**Approval of Manufacturer**" in accordance with **EN 100114-1**. The release certificate for "**Technology Approval Schedule**" in accordance with **CECC 240001** based on **EN 100114-6** is granted for the Vishay BEYSCHLAG manufacturing process.

SPECIALS

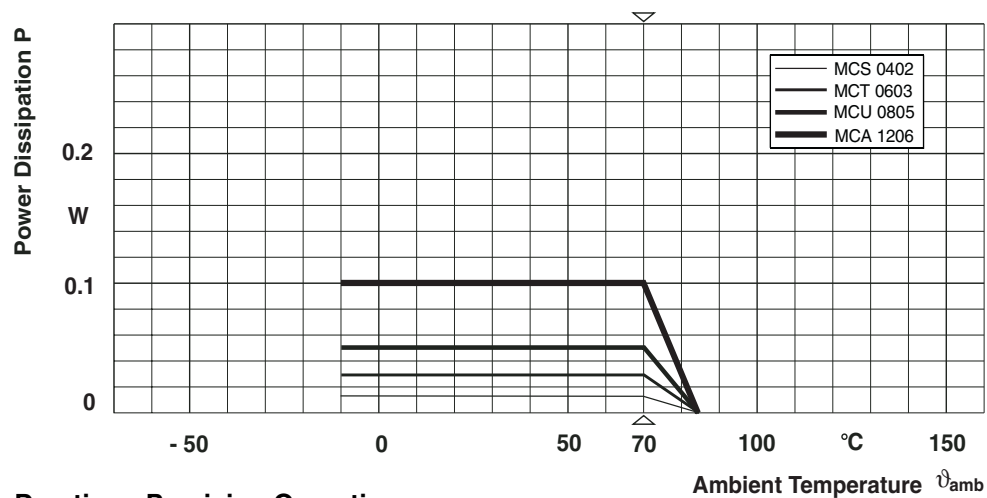
On request, resistors are available with established reliability in accordance with **EN 140 401-801 Version E**. Please refer to the special data sheet for information on failure rate level, available resistance ranges and order codes.



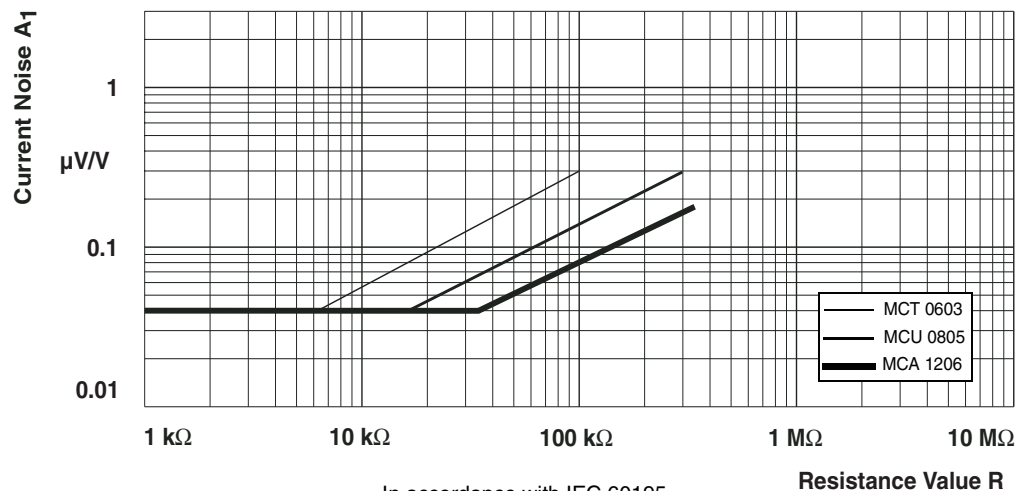
FUNCTIONAL PERFORMANCE



Derating - Standard Operation



Derating - Precision Operation



Current Noise A_1

In accordance with IEC 60195

TEST AND REQUIREMENTS

All tests are carried out in accordance with the following specifications:

EN 60115-1, Generic specification (includes tests)

EN 140 400, Sectional specification (includes schedule for qualification approval)

EN 140 401-801, Detail specification (includes schedule for conformance inspection)

The components are approved in accordance with the European CECC-system, where applicable. The following table contains only the most important tests. For the full test schedule refer to the documents listed above. The testing also covers most of the requirements specified by EIA/IS-703 and JIS-C-5202.

The tests are carried out in accordance with IEC 60068 and under standard atmospheric conditions in accordance with

IEC 60068-1, 5.3. Climatic category LCT/UCT/56 (rated temperature range: Lower Category Temperature, Upper Category Temperature; damp heat, long term, 56 days) is valid. Unless otherwise specified the following values apply:

Temperature: 15 °C to 35 °C

Relative humidity: 45 % to 75 %

Air pressure: 86 kPa to 106 kPa (860 mbar to 1 060 mbar).

The components are mounted for testing on boards in accordance with EN 60115-1, 4.31 unless otherwise specified.

The parameters stated in the Test Procedures and Requirements table are based on the required tests and permitted limits of EN 140 401-801. However, some additional tests and a number of improvements against those minimum requirements have been included.

| TEST PROCEDURES AND REQUIREMENTS | | | | | |
|----------------------------------|----------------------------------|--|---|--|---|
| EN 60115-1 CLAUSE | IEC 60068-2 TEST METHOD | TEST | PROCEDURE | REQUIREMENTS PERMISSIBLE CHANGE | |
| | | | | STABILITY CLASS 0.1 | STABILITY CLASS 0.25 |
| | | | stability for product types: | | |
| | | | MCS 0402 | 470 Ω to 10 kΩ | > 10 kΩ to 52.3 kΩ |
| | | | MCT 0603 | 100 Ω to 10 kΩ | 39 Ω to < 100 Ω; > 10 kΩ to 511 kΩ |
| | | | MCU 0805 | 100 Ω to 47.5 kΩ | 39 Ω to < 100 Ω; > 47.5 kΩ to 1.5 MΩ |
| | | | MCA 1206 | 47 Ω to 332 kΩ | 39 Ω to < 47 Ω; > 332 kΩ to 2 MΩ |
| 4.5 | - | resistance | | ± 0.1 %; ± 0.25 % | |
| 4.8.4.2 | - | temperature coefficient | at 20 / - 10 / 20 °C and 20 / 85 / 20 °C | ± 25 ppm/K; ± 15 ppm/K; ± 10 ppm/K | |
| 4.25.1 | - | endurance at 70 °C: precision operation mode | $U = \sqrt{P_{70} \times R}$ or $U = U_{max}$; whichever is the less severe; 1.5 h on; 0.5 h off 70 °C; 1000 h 70 °C; 8000 h | ± (0.1 % R + 0.02 Ω) ¹⁾ ± (0.2 % R + 0.02 Ω) ¹⁾ | |
| | - | endurance at 70 °C: standard operation mode | $U = \sqrt{P_{70} \times R}$ or $U = U_{max}$; whichever is the less severe; 1.5 h on; 0.5 h off 1.5 h on; 0.5 h off 70 °C; 1000 h 70 °C; 8000 h | ± (0.2 % R + 0.02 Ω) ¹⁾ ± (0.4 % R + 0.05 Ω) ¹⁾ | |



| TEST PROCEDURES AND REQUIREMENTS - continued | | | | | |
|--|--|--|---|--|--|
| EN 60115-1 CLAUSE | IEC 60068-2 TEST METHOD | TEST | PROCEDURE | REQUIREMENTS PERMISSIBLE CHANGE | |
| | | | | STABILITY CLASS 0.1 | STABILITY CLASS 0.25 |
| | | | stability for product types: | | |
| | | | MCS 0402 | 470 Ω to 10 k Ω | > 10 k Ω to 52.3 k Ω |
| | | | MCT 0603 | 100 Ω to 10 k Ω | 39 Ω to < 100 Ω ; > 10 k Ω to 511 k Ω |
| | | | MCU 0805 | 100 Ω to 47.5 k Ω | 39 Ω to < 100 Ω ; > 47.5 k Ω to 1.5 M Ω |
| | | | MCA 1206 | 47 Ω to 332 k Ω | 39 Ω to < 47 Ω ; > 332 k Ω to 2 M Ω |
| 4.25.3 | - | endurance at upper category temperature | 85 °C; 1000h 125 °C; 1000h | $\pm (0.1 \% R + 0.02 \Omega)$ $\pm (0.2 \% R + 0.02 \Omega)$ | $\pm (0.2 \% R + 0.02 \Omega)$ $\pm (0.25 \% R + 0.05 \Omega)$ |
| 4.24 | 78 (Cab) | damp heat, steady state | (40 \pm 2) °C; 56 days; (93 \pm 3) % RH | $\pm (0.1 \% R + 0.02 \Omega)$ | $\pm (0.25 \% R + 0.05 \Omega)$ |
| 4.23 4.23.2 4.23.3 4.23.4 4.23.5 4.23.6 | 2 (Ba) 30 (Db) 1 (Aa) 13 (M) 30 (Db) | climatic sequence: dry heat damp heat, cyclic cold low air pressure damp heat, cyclic | UCT; 16 h 55 °C; 24 h; > 90 % RH; 1 cycle LCT; 2 h 8.5 kPa; 2 h; 25 \pm 10 °C 55 °C; 5 days; > 95 to 100 % RH; 5 cycles LCT = - 55 °C; UCT = 125 °C | $\pm (0.1 \% R + 0.02 \Omega)$ | $\pm (0.25 \% R + 0.05 \Omega)$ |
| - | 1 (Aa) | cold | - 55 °C; 2h | $\pm (0.05 \% R + 0.01 \Omega)$ | |
| 4.19 | 14 (Na) | rapid change of temperature | 30 minutes at LCT and 30 minutes at UCT; LCT = - 10 °C UCT = 85 °C; 5 cycles | $\pm (0.05 \% R + 0.01 \Omega)$ no visible damage | |
| | | | LCT = - 55 °C; UCT = 125 °C; 1000 cycles | $\pm (0.25 \% R + 0.05 \Omega)$ no visible damage | |
| 4.13 | - | short time overload; precision operation mode | $U = 2.5 \times \sqrt{P_{70} \times R}$ or $U = 2 \times U_{max}$; whichever is the less severe; 5s | $\pm (0.05 \% R + 0.01 \Omega)$ | |
| | | short time overload; standard operation mode | | $\pm (0.05 \% R + 0.01 \Omega)$ | |
| 4.27 | - | single pulse high voltage overload; standard operation mode | severity no. 4: $U = 10 \times \sqrt{P_{70} \times R}$ or $U = 2 \times U_{max}$; whichever is the less severe; 10 pulses 10 μ s/700 μ s | $\pm (0.5 \% R + 0.05 \Omega)^{2)}$ no visible damage | |
| 4.37 | - | periodic electric overload; standard operation mode | $U =$ or $U = 2 \times U_{max}$; whichever is the less severe; 0.1 s on; 2.5 s off; 1000 cycles | $\pm (0.5 \% R + 0.05 \Omega)^{2)}$ no visible damage | |

TEST PROCEDURES AND REQUIREMENTS - continued

| EN 60115-1 CLAUSE | IEC 60068-2 TEST METHOD | TEST | PROCEDURE | REQUIREMENTS PERMISSIBLE CHANGE | |
|--|----------------------------------|--|---|--|---|
| | | | | STABILITY CLASS 0.1 | STABILITY CLASS 0.25 |
| | | | stability for product types: | | |
| | | | MCS 0402 | 470 Ω to 10 kΩ | > 10 kΩ to 52.3 kΩ |
| | | | MCT 0603 | 100 Ω to 10 kΩ | 39 Ω to < 100 Ω; > 10 kΩ to 511 kΩ |
| | | | MCU 0805 | 100 Ω to 47.5 kΩ | 39 Ω to < 100 Ω; > 47.5 kΩ to 1.5 MΩ |
| | | | MCA 1206 | 47 Ω to 332 kΩ | 39 Ω to < 47 Ω; > 332 kΩ to 2 MΩ |
| 4.22 | 6 (Fc) | vibration | endurance by sweeping; 10 to 2000 Hz; no resonance; amplitude ≤ 1.5 mm or ≤ 200 m/s²; 6 h | ± (0.05 % R + 0.01 Ω) no visible damage | |
| 4.17.2 | 58 (Td) | solderability | solder bath method; SnPb40; non-activated flux (215 ± 3) °C; (3 ± 0.3) s | good tinning (≥ 95 % covered); no visible damage | |
| | | | solder bath method; SnAg3Cu0,5 or SnAg3,5; non-activated flux (235 ± 3) °C; (2 ± 0.2) s | | |
| 4.18.2 | 58 (Td) | resistance to soldering heat | solder bath method; (260 ± 5) °C; (10 ± 1) s | ± (0.05 % R + 0.01 Ω) | |
| 4.29 | 45 (XA) | component solvent resistance | isopropyl alcohol + 50 °C; method 2 | no visible damage | |
| 4.32 | 21 (Ue₃) | shear | RR 1005M and RR 1608M; 9 N RR 2012M and RR 3216M; 45 N | no visible damage | |
| 4.33 | 21 (Ue₁) | substrate bending | depth 2 mm, 3 times | ± (0.05 % R + 0.01 Ω) no visible damage, no open circuit in bent position | |
| 4.7 | - | voltage proof | Urms = U _{ins} ; 60 ± 5 s | no flashover or breakdown | |
| 4.35 | - | flammability | IEC 60695-2-2, needle flame test; 10 s | no burning after 30 s | |
| Special requirements for type MCA 1206 | | | | | |
| 4.25.1 | - | endurance at 70 °C: precision operation mode | U = √P ₇₀ × R or U = U _{max} ; whichever is the less severe 70 °C; 1000 h 70 °C; 8000 h | ± (0.05 % R + 0.02 Ω) ± (0.1 % R + 0.02 Ω) | |
| | - | endurance at 70 °C: standard operation mode | U = √P ₇₀ × R or U = U _{max} ; whichever is the less severe 70 °C; 1000 h 70 °C; 8000 h | ± (0.1 % R + 0.02 Ω) ± (0.25 % R + 0.05 Ω) | |

Note

- See 4.25.1 (above): special requirements for type MCA 1206.
- The pulse load stability of professional MFC resistors applies for precision resistors also. However, severe pulse loads are likely to jeopardise precision stability requirements.



Notice

Specifications of the products displayed herein are subject to change without notice. Vishay Intertechnology, Inc., or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Vishay's terms and conditions of sale for such products, Vishay assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of Vishay products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Vishay for any damages resulting from such improper use or sale.